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ABSTRACT

The purposes of this paper were to report the results of an examination of differential entry into a publicly funded voucher program in Cleveland, Ohio, and to address other issues around the nature of the voucher population. Specifically, the study attempted to answer the following questions for the academic years 1997-98 through 2000-01: (1) Are there racial/ethnic differences between the applicant cohort and the population from which applicants derive? (2) Are there racial/ethnic differences between applicant subgroups? (3) Do the applicant subgroups differ in terms of family income? (4) Do the groups differ in terms of family size? and (5) Do the groups differ in terms of previous school of enrollment (public or private school). The results of the study showed that applicants to the voucher program were highly similar to the general student population in the district; the process by which vouchers are initially awarded to families is effective in focusing opportunities toward targeted families; and students who won but did not use vouchers were of lower income and more likely to be minority than those who won and used vouchers. (WFA)

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A Longitudinal Examination of the Demographic Characteristics of Applicants and Entrants to the Cleveland Scholarship and Tutoring Program

ED 482 353

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Introduction

School choice, in its myriad forms, is arguably the most pervasive and passionately debated educational policy in the U.S. today. Many of these choice options are neither new nor particularly contentious. Magnet schools and intra-district open enrollment programs represent such options. In contrast, however, other options reflect dramatic challenges to traditional beliefs about the nature and purposes of schooling. Charter schools, in their growing numbers, represent a comparatively mild revision of how "public" schooling might be offered. But the "mother of all" school choice options is the use of public education funds to support enrollment in private, even religiously affiliated schools -- vouchers.

In the wake of the U.S. Supreme Court ruling in June of last year, the issue of publicly-funded voucher programs is larger than ever. A growing number of states are in some stage of consideration of legislation that supports private school choice, and nearly every educational periodical has one or more article about new or proposed choice programs. Despite this intense interest, the body of empirical research on the operation or impacts of such programs remains relatively small, though it is expanding. Even Paul Peterson of Harvard, perhaps the single most prolific researcher on the topic, has noted that research on vouchers is incomplete (Howell & Peterson, 2002).

Across studies of both publicly and privately funded voucher programs, researchers have concluded that the operational structures and policies that guide the program have substantial and undeniable impacts on both the process and outcomes. Witte (2002), in summarizing four years of direct and intensive study of the voucher program in Milwaukee noted that policies for eligibility, selection, and use of vouchers in ways that match program goals would be fundamental to the effectiveness of any voucher program. Howell and Peterson (2002) and our own work in Cleveland similarly suggest that programmatic structure and administration directly affect the characteristics of and impacts on students.

2 Demographics of Applicants and Entrants

Publicly-funded voucher programs are generally intended to target families of low income who reside in urban school districts. As such, they intend to provide the opportunity for private school enrollment that would otherwise not be available. In this regard, the programs in both Milwaukee and Cleveland give first priority to children whose families meet these criteria. Research on these programs suggests that this approach is largely effective: families who are offered vouchers are of low income, reside in the inner city, and are headed by a single mother (e.g., see Witte, 2002; Metcalf, Boone, Muller, Stage, and Tait, 1999).

Despite this, concern remains high that voucher programs, perhaps even those that are narrowly targeted, will promote increased segregation on the basis of income, race or ethnicity, and parental interest, involvement, and support of children's education. Critics, like Henig (1994) suggest that "vouchers [will] drain the best and brightest students from public schools" and "Over the longer term…voucher [will] erode the political constituency that historically [as] sustained the public system (pp. 70-71).

The issue, then, is the extent to which differential entry and attrition over time may change the nature or characteristics of the population of students who use a voucher. It is clear that the *rates* of mobility and attrition are very similar for voucher students and their public school peers (e.g., Metcalf, et al., 1999; Witte, Thorn, Pritchard, and Claibourn, 1994). Students move out of the voucher program and out of the school district in comparable proportions (in Cleveland and Milwaukee this is approximately 15% annually). But as some researchers have pointed out, what research has not examined are the characteristics of students who move into and out of the voucher program (e.g., Molnar, 1998). As new students enter the program over time and other students elect to leave the program, does the nature of the voucher population continue to reflect that which was targeted?

A lack of longitudinal studies of voucher programs limits the extent to which the issue can be investigated. Witte's work in Milwaukee used aggregate data and was funded for only four years. Studies reported in Howell and Peterson (2002) did not account for

student attrition and collected data on over only three years. It is in this regard that the longitudinal nature of the ongoing evaluation in Cleveland offers a unique opportunity.

Study Purpose and Research Questions

The purposes of this paper are twofold: to report the results of an examination of differential entry into a publicly-funded voucher program, and to address issues Witte first began examining in 1991. We draw from data collected during the period 1997-2001 from the Indiana Center for Evaluation's longitudinal study of the Cleveland Scholarship and Tutoring Program (CSTP) in Cleveland,. Specifically, the inquiry conducted here attempts to examine patterns in potentially differential entry with regard to the following questions:

1. Are there racial/ethnic differences between the applicant cohort and the population from which applicants derive?

2. Are there race/ethnic differences between applicant subgroups (i.e. winner users, winner non-users, and applicant non-recipients) within and across the academic years (1997-1998 through 2000-2001)?

3. Do the applicant subgroups differ within and across the academic years (1997-2001) in terms of family income?

4. Do the groups differ within and/or across the academic years (1997-2001) in terms of family size?

5. Do the groups differ within and/or across the academic years (1997-2001) in terms of previous school of enrollment; that is, whether the individuals were in public schools or private schools when they applied for a voucher?

4 Demographics of Applicants and Entrants

Background

Longitudinal evaluation of the Cleveland Scholarship and Tutoring Program, conducted by the Indiana Center for Evaluation, has followed a cohort of voucher students[1] for the last six years, beginning when the students were in kindergarten during the 1997-1998 academic year. While the study remains in progress and the children are currently (during the 2002-2003 school year) in 5th grade, for the purposes of the present analyses we examine data from 1997-2001, or kindergarten through third grade. By examining demographic differences of applicants of a publicly-funded voucher program, this research seeks to help both proponents and opponents of vouchers through the addition of findings from longitudinal data into the discussion.

Data and Methods

As part of the longitudinal evaluation of the voucher program in Cleveland, The Indiana Center for Evaluation collects, yearly, programmatic data from both the Cleveland Municipal School District (CMSD) and the Cleveland Scholarship and Tutoring Program (CSTP) office records. For the purposes of these analyses, CSTP records provided information that included demographic data (e.g. race/ethnicity[2], family size, income[3], previous school of enrollment[4]) for every child who had applied for a voucher during each academic year. Additionally, data provided by both CMSD[5] and the U.S. Census Bureau[6] on the racial composition of the students in Cleveland Municipal School District were utilized to compare CSTP applicants to the pool from which applicants derive.

In each year of the evaluation a "status code" is assigned to each applicant. This code identifies whether an applicant: won and used a voucher (winner users), won a voucher

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[1] While our cohort only represents a sub-section of the entire CSTP population, ongoing examinations of the representativeness of this subsection to the overall CSTP population have yet to identify any systematic differences between the cohort and the overall population.

[2] The Cleveland Scholarship and Tutoring Program utilizes the following race/ethnicity classifications: white, black, Hispanic, multiracial, and other, with Hispanic serving as a distinct race category.

[3] Income data are verified by CSTP staff. Parents/guardians of applicants are required to submit copies of financial documents (e.g. pay stubs, income tax forms, etc.) to CSTP to serve as evidence of income.

[4] For all applicants, research staff utilized CSTP records to identify the school in which students were enrolled when they applied for a scholarship. Research staff coded schools as public and private, however, a previous school of enrollment was not available for all students or the status of a previous school was not certain. In such cases, the student was omitted from previous school of enrollment analyses.

[5] Cleveland Municipal School District Race/Ethnicity data from the 2000-2001 annual report were utilized.

[6] Data from the 2000 Census were utilized.

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but opted to not use it (winner non-user), or was eligible but never awarded a voucher (applicant non-recipients). These status codes were employed to enable examination of demographic differences across each of these subgroups overtime as well as within each academic year.

We utilize Chi-Square analyses to determine whether differences exist across applicant sub-groups (winner-users, winner non-users, and applicant non-recipients) and across the range of demographic variables. Specifically, differences in income, family size, and race/ethnicity are examined across subgroups both within and across academic years. Similarly, patterns are examined across subgroups both within and across academic years with regard to the school (either public or private) in which the applicant was enrolled at the time of the application.

Findings

> *RQ1: Are there racial/ethnic differences between the applicant cohort, overall, as well as by subgroup, and the population from which applicants derive?*

Overall Applicant Cohort population compared to CMSD data.

Data on the ethnic composition[7] of students in grades K-12 in the Cleveland Municipal School District during 2000-2001 were utilized to compare the cohort of applicants to the Cleveland Scholarship and Tutoring Program to the broader population of children. These analyses are interesting as one of the criteria for applying to the CSTP is that the child reside within the Cleveland Municipal School District boundaries[8]. As a result, these analyses allow for comparisons between the ethnic compositions of the pool of applicants to a broader population of children residing within CMSD boundaries who are qualified to apply.

Overall, Chi-square analysis of the racial/ethnic composition (minority or non-minority) of the entire applicant cohort population (i.e., collapsing across the three applicant

[7] CMSD classifies children as black, white, Hispanic, multiracial, and other with Hispanic serving as a distinct race category.

[8] It is important to note that children who reside within the CMSD boundaries but who do not attend a public school will not be represented within the CMSD numbers.

subgroups) each year to the racial/ethnic data on the district reveals a significant difference in only one year. The only statistically significant difference between the applicant cohort population and the overall CMSD population occurred in 2000-2001 when the percentage of non-minority students in the cohort population (30.6%) was higher than the non-minority population for CMSD (19.7%)[9]. All other comparisons of minority/non-minority compositions of the CMSD and the applicant cohort were not significant. It appears that applicants to the voucher program are, generally speaking, relatively similar in minority status to students in the Cleveland public schools.

Applicant Subgroups compared to CMSD data.

Independent chi-square comparisons were conducted for each academic year to examine the racial/ethnic composition of the applicant subgroups with those of CMSD.

Looking within academic years, the percentage of minority students in the applicant non-recipient subgroup was significantly different from CMSD's overall minority population in 1997-1998.[10] That is, in the 1997-1998 academic year (when students in the cohort were in kindergarten), minority students comprise 81.3% of the CMSD student population while only 70.5% of the students in the applicant non-recipient subgroup are minority. So, overall during the 1997-98 academic year, the percentage of white applicant non-recipients is greater than the overall non-minority population in CMSD.

Similarly, for the 1998-1999 academic year, a statistically significant difference exists between the percentage of applicant non-recipient minority students and CMSD's population[11]. Once again, applicants of minority status comprised 72.1% of the applicant non-recipient subgroup and 81.3% of the overall CMSD population. Conversely, in the same year, the percentage of minority students comprising the winner non-user subgroup (88.7%) was greater than that of the district.[12] So, while non-minority students tend to be

[9] $X2\ (1) = 7.773$, $p = 0.005$.
[10] $X2\ (1) = 6.310$, $p = 0.012$
[11] $X2\ (1) = 4.454$, $p = 0.035$.
[12] $X2\ (1) = 4.255$, $p = 0.039$.

underrepresented within the applicant non-recipient subgroup, minority students tend to be *over*represented in the winner non-user subgroup in the 1998-1999 academic year.

Chi-square analyses for the 1999-2000 academic year reveal, once again, that non-minority students disproportionately comprise the applicant non-recipients subgroup as compared to CMSD data with 31.8% of the applicant non-recipients being non-minority as compared to CMSD's overall non-minority population of 18.7%.[13] Further, in this academic year, a difference in the composition of the winner user population as compared to CMSD's emerges in the same direction as the applicant non-recipient group.[14] That is, non-minority students comprise 31% of the winner user subgroup population in 1999-2000 in comparison to 18.7% non-minority population in CMSD.

Finally, comparisons for the 2000-2001 school year reveal a shift in the proportion of minority students comprising the applicant non-recipient subgroup with minority students comprising 90.1% of that population as compared with 81.3% of CMSD's population.[15] The overrepresentation of non-minority students using a voucher, however, is maintained as the winner user group is composed of 32.7% non-minority students as compared to CMSD's population at 18.7%.[16] Table 1 presents the percentages of minority and non-minority students by subgroup across years. See Appendix A for additional information about sample sizes.

[13] $X2\ (1) = 9.543$, $p = 0.002$.
[14] $X2\ (1) = 8.343$, $p = 0.004$.
[15] $X2\ (1) = 6.656$, $p = 0.01$.
[16] $X2\ (1) = 10.99$, $p = 0.001$.

Table 1. Percentage of minority and non-minority by applicant subgroup.

		Minority	*Non-Minority*
		%	%
ANR	97-98	70.5	29.5
	s98-99	72.1	27.9
	99-00	68.2	31.8
	00-01	90.9	9.1
WNU	97-98	80.9	19.1
	s98-99	88.7	11.3
	99-00	89.1	10.9
	00-01	75.3	24.7
WU	97-98	75.2	24.8
	s98-99	72.8	27.2
	99-00	69.0	31.0
	00-01	67.3	32.7
CMSD	00-01	81.3	19.7
Census	00-01	66.78	31.15

Overall Applicant Cohort Population Compared to Census data.

Similarly, census data[17] on the ethnic composition[18] of the student population within Cleveland Municipal School District were utilized to compare the racial/ethnic composition of the applicant cohort to the broader student population from which applicants are derived. While Census data on the ethnic composition of students in CMSD differs from CMSD reported data on the ethnic composition of its student population[19], no significant differences were found between the applicant cohort and the Census CMSD ethnic/racial comparisons.

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[17] Census data for Cleveland Municipal School District's student population were drawn from 2000 data available at the National Center for Education Statistics website http://nces.ed.gov/.

[18] The 2000 census treated race/ethnic categories differently than it had in the past. Beginning in 2000, respondents could chose White, black or African American, Asian, Hawaiian or other Pacific Islander, Other, or Multiracial as a race. Then, separately, respondents identified whether they were Hispanic or Latino, or Not of Hispanic descent thereby resulting in an individual who can identify a race (e.g. Asian) and an ethnicity (e.g. Hispanic) which is different from how CMSD and CSTP have maintained racial/ethnic data to date (see footnotes 2 and 7 for information on how CMSD and CSTP maintain racial/ethnic records).

[19] Chi-Square comparisons reveal a statistically significant difference between CMSD reported ethnic/racial composition of its student population and the census statistics on the ethnic/racial composition of the student population residing in CMSD, with reported CMSD data consisting of more minority students than census data reports.

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Applicant Subgroups compared to Census data.

In an attempt to examine the ethnic/racial composition of the applicant subgroups to the broader population of students from which the applicants are derived, chi-square comparisons between each of the applicant subgroups and census data on CMSD's student population were conducted. In each year, one of the applicant subgroups differed significantly from the census data with the CSTP applicant subgroups containing more minority students than census reports.

In three of the academic years for which subgroup data were examined (1997-98, 1998-99, and 1999-00) the census estimates of CMSD's minority population was 66.78%, while the winner non-user population percentages were at 80.9%, 88.7%, and 89.1%, respectively[20]. So the minority population in Cleveland appears to be overrepresented in the winner non-user population during those years. In 2000-2001, the same appears to be true of the applicant non-recipient population such that the percentage of applicant non-recipient minority students (90.1%) was higher than the census percentage of minority students (66.78%).[21] Across all of the years, the ethnic composition of the winner user population did not differ significantly from the census' racial/ethnic data on CMSD's student population.

> *RQ2: Are there race/ethnic differences between the groups (i.e. winner users, winner non-users, and applicant non-recipients) within and across the academic years (1997-2002)?*

Racial/Ethnic Differences between applicant subgroups within academic years.

Chi-Square analyses examining differences in minority status of applicant subgroups within each of the four academic years from which data are available found statistically significant differences between minority[22] and non-minority status for all four years. Appendix B provides the overall and post hoc chi-square statistics for all of the following analyses. In general, when examining each year's data, a slight pattern emerges with winner non-users tending to be more minority than either the applicant non-recipient or

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[20] $X2\ (1) = 7.647$, $p = 0.006$ for 1997-1998; $X2\ (1) = 19.844$, $p < 0.001$ for 1998-1999; $X2\ (1) = 20.624$, $p < 0.001$ for 1999-2000.

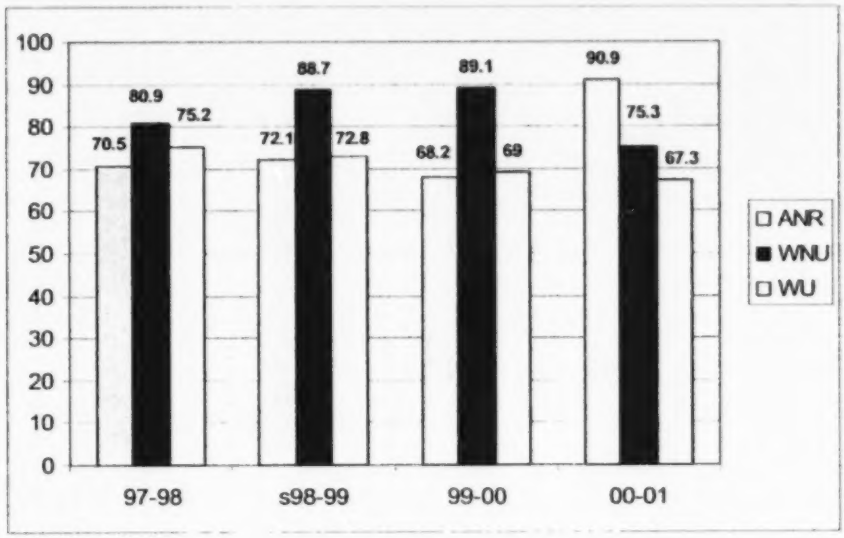
[21] $X2\ (1) = 23.752$, $p < 0.001$.

[22] Individuals who were classified as African-American, Hispanic, Multiracial, or "Other," were recoded as Minority, while those classified as White were recoded as Non-Minority.

the winner user groups; with differences between the applicant non-recipient and winner non-user group being only descriptive (rather than significant) in 2000-2001.

Examining the patterns year by year, in 1997-1998, winner non-users and winner-users are more minority than applicant non-recipients, with winner non-users being more minority than winner users. The trends in 1998-99 and 1999-00 are identical to one another; winner non-users being more minority than applicant non-recipients and winner users with no statistically significant differences between the applicant non-recipients and the winner users. In 2000-2001, the trend changes slightly with winner non-users and applicant non-recipients being statistically more minority than winner users, but only descriptively different from each other. Figure 1 depicts these differences.

Figure 1. Percent of minority students comprising each subgroup



Racial/Ethnic Differences between applicant subgroups across academic years.
While examination of differences between applicant subgroups within a given year is useful for descriptive purposes, the examination of subgroups across several years

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enables one to begin to examine programs for trends that may be occurring over time. As a result, independent Chi-square analyses examining the percentages of minority and non-minority students within each applicant subgroup over time were conducted. For all analyses, data from the 1997-1998 academic year were utilized as the comparison year[23].

For applicant non-recipients, there was a greater percentage of minority students (90.0%) in the academic year 2000-2001 than in 1997-1998 (70.5%); however none of the other years revealed any significant differences in the ethnic/racial composition of applicants within this subgroup.[24]

Similarly, Chi-square comparisons in the ethnic/racial composition of the winner non-user subgroup found some significant differences across years. In particular, in the academic year of 1997-1998, there were fewer minority applicants (80.9%) within the winner non-user subgroup than in 1998-1999 (88.7%) and 1999-2000 (89.1%).[25] There was not, however, a significant difference between the percentage of minority and non-minority students in the winner non-user applicant subgroup in 2000-2001 and 1997-1998 academic years. So, the winner non-user subgroup is increasingly comprised of minority families.

As for the winner user group, Chi-square analyses did not reveal a statistically significant difference between the percentage of winner user minority and non-minority students across any of the academic years as compared to the academic year 1997-1998.

RQ3: Do the groups differ within and across the academic years in terms of family income?

Income across subgroups within academic years.

Independent analyses of variance were conducted to examine between group differences in income for each of the four academic years. For each year, the omnibus F test revealed significant differences between or among two or more of the groups, and

[23] Since data were first collected in 1997-1998, we utilized the data from this year for comparison purposes.
[24] $X2\ (1) = 20.01$, $p < 0.001$.
[25] $X2\ (1) = 3.937$, $p = 0.047$ for 1998-1999 compared to 1997-1998, $X2\ (1) = 4.352$, $p = 0.037$ for 1999-2000 compared to 1997-1998.

Games-Howell[26] post hoc techniques were subsequently performed. In each year, students whose families applied for but did not receive a voucher had significantly higher incomes than families in either the winner user and winner non-user groups. Further, while there were no significant differences in income between winner users and winner non-users in the academic years 1997-98 and 1998-99, families that had won and were using a voucher to attend private schools had significantly higher incomes than families who won but had chosen not to use a voucher in the academic years 1999-00 and 2000-01. Figure 2 presents these differences.

Figure 2. Analysis of variance analyses of income across subgroups within each academic year

1997/1998: Income across subgroups

Applicant non-Recipient	Winner user	Winner Non-User
$20,752.57		
	$12,394.83	$11,460.01

1998/1999: Income across subgroups

Applicant non-Recipient	Winner user	Winner Non-User
$19,437.83		
	$13,801.34	$12,061.82

1999/2000: Income across subgroups

Applicant non-Recipient	Winner user	Winner Non-User
$26,479.56		
	$17,199.41	
		$11,666.12

2000/2001: Income across subgroups

Applicant non-Recipient	Winner user	Winner Non-User
$38,282.00		
	$23,311.77	
		$17,414.00

Interpretation: The blue underline indicates statistically significant differences. Incomes that *are* connected by a common underline DO NOT differ at a statistically significant level. Similarly, if incomes are NOT connected by a common underline, they DO differ significantly with the others.

[26] Games-Howell was selected due to its ability to manage unequal sample sizes and unequal variances.

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Income within subgroups across academic years.

Examining each subgroup for differences in income levels across the four academic years, independent analyses of variance were conducted. While the analysis of the winner non-user subgroup did not reveal any significant differences in income over the four academic years, analysis of the applicant non-recipient and the winner user subgroups identified differences. Figure 3 represents these differences.

Specifically, analysis of the applicant non-recipient subgroup yielded statistically significant differences between or among two or more of the years[27], with the Tukey-Kramer[28] post hoc comparison procedure revealing statistically significant differences in the income of applicant non-recipients during the 2000-01 academic year as compared with any of the other academic years. That is, applicant non-recipients' income was significantly higher in 2000-2001 than in any of the other three academic years examined.

Further, analysis of the winner user subgroup identified statistically significant differences between or among two or more of the years.[29] Follow-up comparisons utilizing the Games-Howell[30] procedure resulted in statistically significant differences between each academic year such that income of each subsequent academic year is greater than the previous (e.g. income in 1998-99 is higher than income in 1997-98).

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[27] $F(3, 1421) = 15.689$, $p < 0.001$.
[28] Tukey-Kramer post hoc comparison procedure was utilized due to unequal sample sizes.
[29] $F(3, 3081) = 113.038$, $p < 0.001$. Levene's test for homogeneity of variance was violated for this analysis, indicating unequal variances.
[30] Games-Howell post hoc comparison procedure was utilized due to unequal sample sizes and unequal variances.

Figure 3. Mean Income by Applicant Subgroup Across Academic Years

Mean Income of Applicant non-recipients over time

1997/98	1998/99	1999/2000	2000/01
$20,752.57	$19,437.83	$26,479.56	$38,282.00

Mean Income of Winner users over time

1997/98	1998/99	1999/2000	2000/01
$12,394.31	$13,801.14	$17,199.41	$23,311.77

Mean Income of Winner non-users over time

1997/98	1998/99	1999/2000	2000/01
$11,460.01	$12,061.82	$11,666.12	$17,414.00

Interpretation: The blue underline indicates statistically significant differences. Incomes that *are* connected by a common underline DO NOT differ at a statistically significant level. Similarly, if incomes are NOT connected by a common underline, they DO differ significantly with the others.

RQ4: *Do the groups differ within and/or across the academic years in terms of family size?*

Independent analyses of variance were conducted to identify differences within academic years in terms of family size. The analysis of variance did not detect any significant differences in any of the groups or years examined. Table 2 presents the means and standard deviations for family size by academic year collapsing all subgroups into one, while Table 3 provides means by applicant subgroup across academic years.

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Table 2. Mean Family Size of Entire Applicant Population within Academic Years

Academic Year	Mean	SD
1997-98	3.77	1.39
1998-99	3.85	1.52
1999-00	3.86	1.41
2000-02	3.92	1.40

Table 3. Family Size by Applicant Sub-group by Year

Subgroup / Academic Year	Applicant non-recipient		Winner non-user		Winner user	
	N	M	N	M	N	M
1997-1998	653	3.74	340	4.01	827	3.74
1998-1999	514	3.89	62	3.65	874	3.85
1999-2000	379	3.85	304	3.82	718	3.87
2000-2001	22	3.64	74	4.00	671	3.93

RQ5: Do the applicant subgroups differ within and/or across the academic years in terms of the previous school attended prior to application for a voucher?

Prior School of Enrollment Across All Academic Years

Descriptive examination of the prior school of enrollment of the entire applicant population across all academic years reveals that applicants, overall, are slightly more likely to have attended a private school in the year prior to their application. Examining the prior schools of enrollment for each subgroup, a larger percentage of winner users

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attended a private school previously, while a greater percentage of applicant non-recipients and winner non-users attended public schools previously (see Table 4)

Table 4. Prior School of Enrollment Across Applicant Subgroups

	Public School		Private School	
Applicant Subgroup	**%**	**N**	**%**	**N**
Applicant, non-recipient	**59.7**	**735**	**40.3**	**496**
Winner, non-user	**69.0**	**435**	**31.0**	**195**
Winner, user	**30.5**	**522**	**69.5**	**1192**
All applicants (subgroups collapsed)	**47.3%**	**1692**	**52.7%**	**1883**

Specifically, for the applicant non-recipient group, chi-square analyses revealed a statistically significant difference in the percentage whose previous school was a public school versus a private school across the four academic years.[31] Post hoc comparisons resulted in statistically significant differences between the 1997-1998 academic year as compared to the other three academic years (i.e.1998-1999, 1999-2000, and 2000-2001) such that more students in 1997-1998 (69.2%) identified a private school as their prior school of enrollment than in any of the other academic years (30.8%, 35.0%, and 30.4%, respectively) (See Table 5). Appendix C provides the chi-square values for these analyses for the overall and post hoc comparisons.

Table 5. Applicant Non-Recipient: Prior School of Enrollment Across AcademicYears

	Applicant Non-Recipient			
	Public		Private	
Academic Year	%	N	%	N
1997-1998	30.8	81	69.2	182
1998-1999	69.2	393	30.8	175
1999-2000	65.0	245	35.0	132
2000-2001	69.6	16	30.4	7

For winner non-users, there was a statistically significant difference in the percentage who were previously enrolled in a public school versus a private school across the four academic years. Post hoc comparisons resulted in significant differences between the

[31] $X2 (3) = 117.890, p < 0.001$.

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academic year 1997-1998 as compared to 1999-2000 and 2000-2001, such that fewer winner non-users in 1997-1998 identified a public school as their previous school than did winner non-users in 1999-2000 and in 2000-2001. Similarly, there were statistically significant differences between the academic year 1998-1999 as compared to the academic years 1999-2000 and 2000-2001, again such that fewer winner non-users in 1998-1999 previously came from public schools (See Table 6).

Table 6. Winner Non-User: Prior School of Enrollment Across Years

	Winner Non-Users			
	Public		Private	
Academic Year	%	N	%	N
1997-1998	39.7	56	60.3	85
1998-1999	58.6	17	41.4	12
1999-2000	80.2	231	19.8	57
2000-2001	76.2	131	23.8	41

Results of chi-square comparisons of winner-users also resulted in a statistically significant difference in the percentage of applicants whose previous school of enrollment was a public school versus a private school across the four academic years. Post hoc comparisons resulted in statistically significant differences between the academic year 1997-1998 as compared to the other three academic years of 1998-1999, 1999-2000, and 2000-2001, such that more winner-users in 1997-1998 (81.5%) identified a private school as their previous school than in any of the other academic years (67.8%, 64.7%, and 63.4%, respectively). Table 7 illustrates these differences.

Table 7. Winner Users: Prior School of Enrollment Across Years

	Winner User			
	Public		Private	
Academic Year	%	N	%	N
1997-1998	18.5	85	81.5	375
1998-1999	32.2	119	67.8	250
1999-2000	35.3	152	64.7	279
2000-2001	36.6	166	63.4	288

Discussion

Five questions guided the analyses in the present study. Specifically, questions investigated pertained to the demographic characteristics of three applicant subgroups over time as well as by academic year. Demographic characteristics specifically examined included race/ethnicity, income, family size, and prior school of enrollment, each of which are discussed below.

Racial/Ethnic Composition

While there are statistically significant differences in the race/ethnicity data reported by CMSD on the district and by the census on CMSD's district, when comparing our *overall* cohort, over the years, to either CMSD's reported data or to the census data for the district, there are no statistically significant differences between the overall cohort and CMSD's student population. That is, when looking across the years, the overall applicant cohort is representative of CMSD's student population, which seems to suggest, at first glance, that the program is attracting an ethnically representive range of applicants.

When examining the racial/ethnic composition of each applicant subgroup by year as compared to CMSD's data and the census data for the district, however, significant differences exist. Examining data by year reveals a trend such that the winner user and the applicant non-recipient group is comprised of a greater proportion of non-minorities (e.g. white students) than the overall CMSD population[32], while the winner non-user group is comprised of a greater number of minority students compared to CMSD. While the years in which the differences are significant are slightly different[33], these patterns hold true in comparisons both with census data as well as with district data. This seems to suggest program selection and parental self-selection into the program once awarded a voucher is not maintaining racial/ethnic representation of the overall population in CMSD. Given that historically, there is a tendency to be a strong correlation between race and income and that entrance into the program is strongly based on income, it would

[32] Applicant non-recipient comparisons are statistically significant in every year examined.

[33] Since CMSD's data and the census data on the district are significantly different from each other, it would follow that comparisons using these data would also differ. As a result, years where differences are observed between the applicant cohort and CMSD reported data may differ from the years differences are observed between the applicant cohort and census data for the district.

follow that those who are not admitted to the program would be of higher income and hence more likely to be non-minority. Similarly, it would follow that those families who do not or can not use an awarded voucher would be from lower income families and are more likely to be minority.

When comparing the racial/ethnic compositions of the applicant subgroups to each other, winner non-users tend to be more minority than either than the applicant non-recipient or the winner user groups. Further, within the applicant non-recipient subgroup, in 2000-2001, the percentage of minority students in this population was significantly higher than any other year, perhaps suggesting more minority families may have applied for a voucher during this academic year. Perhaps this is a trend that will be observed as additional years of data are included in these analyses.

Income Comparisons

Descriptively looking across the research questions and analyses, the data suggest that families of winner non-users tend to have lower incomes than the other two applicant subgroups. As one would expect given the income criteria for the awarding process, applicant non-recipients have significantly higher incomes than either winner-users or winner non-users. Also noteworthy is the fact that winner non-users consistently have lower income levels than winner-users, for which the levels were statistically significant. Again, this suggests that winner non-users may be selecting to not use an awarded voucher for financial reasons. That is, they self-select out of the program because they can not afford to pay the required parental tuition contribution of 10% or 25%.[34]

Family Size Comparisons

In all comparisons of family size within and across groups within and across academic years, no significant differences were identified. While our data show no significant differences, it would be worth investigating to see if the family members who comprise

[34] The Cleveland voucher program covers either 75% or 90% of the cost of tuition at a private school. The exact percentage (i.e. 10% or 25%) parents are required to provide is based on parental income levels such that parents whose income are 100-200% below the federal poverty index pay 10% and those whose income are greater than that pay 25%.

the family size number differ across subgroups. That is, if winner users are more likely to have multiple adults living in the household, while winner non-users are more likely to have two children living with one adult, it might explain some of the differences in voucher usage, given that the family with two children would have more educational expense burdens than the family with only one child.[35]

Prior School of Enrollment Comparisons

Examining prior school of enrollment data, across all academic years, winner-users are more likely to have attended a private school previously, while a greater percentage of applicant non-recipients and winner non-users attended public schools previously. These differences can, to some extent, be explained by the manner in which vouchers, specifically those awarded after the start of the school year, are made available. Specifically, vouchers (those initially awarded but that were not going to be used) awarded after the start of the school year, are awarded on a first come, first serve basis and require proof of acceptance into a private school. Thus, families with children already enrolled in a private school are most able to take advantage of these.

Conclusion

The present study sought to investigate questions associated with the potential segregational effects of school choice made possible through publicly-funded vouchers. As we noted at the outset of this paper, evidence from both Milwaukee and Cleveland indicate these targeted voucher programs appear to be mostly successful in ensuring that the low income, inner city families they seek to serve are most likely to be awarded a voucher. However, we have attempted to examine whether the composition or characteristics of voucher applicants may change over time in ways that are unintended.

Our results suggest at least three interesting conclusions. First, when all applicants to the program are collectively compared to the student population within CMSD, they are highly similar. This is generally true regardless of the academic year being examined (first through third grade) or whether the CMSD population is defined using district

[35] The nature of our data did not allow us to examine family size in terms of specific family composition.

records or U.S. Census data. The greatest majority of students are African-American and low income. Thus, the application process seems effective in drawing a reasonably representative sample of students, and it does not appear to encourage or discourage any particular group of families to apply for a voucher.

Second, it appears that the process by which vouchers are initially awarded to families similarly is effective in focusing opportunities toward targeted families. With some exceptions, vouchers are largely awarded to families of low income. And, proportionally, these families are roughly representative of the Cleveland public school population both in income and ethnicity or race. Further, and importantly, the program tends to effectively focus voucher awards on families of lowest income. Families who applied for but did not receive a voucher are more likely to be higher income. Thus, again, the organizational processes by which vouchers are awarded seems to support the intended goals.

Third, however, there is an interesting pattern of differences in the characteristics of students who are awarded a voucher and between those who choose to use the voucher and those who do not use the voucher and continue to attend public schools. Though only significant in the later two years of this study, students who win but do not use a voucher are of lower income and more likely to be minority than those who win and use the voucher. Thus, while the initial application and award process seem to afford the voucher opportunity to families for whom the programs are targeted to serve, use of the vouchers is much less well distributed. The reasons for this remains unclear. It is possible, of course, that private schools may, in fact, deliberately attempt to discourage students whom they view as potentially difficult from enrolling in the school. Alternatively, and in our view more likely is the explanation that the practicalities of private school enrollment (e.g., transportation, covering tuition beyond the voucher, etc.) make it much more difficult for poor families (who may also be more likely in the present study to be minority) to take advantage of this opportunity. The relatively low dollar amount of the voucher itself (not more than $2,500) and the partial tuition element (from 75% to 90% of total tuition) of the program in Cleveland exacerbate these difficulties for

low income families. In any event, it is important that research on vouchers attempt to examine and potentially explain this issue.

Certainly, our work in Cleveland will continue to examine these areas to identify patterns in differential entry that policy may work to address for future voucher populations. Further, we would hope that others doing voucher research would consider these issues and begin to incorporate examination of them into their future research.

Appendix A. Demographic Information for each subgroup By Year

[redacted]		Family Size		Minority		Non-Minority		Male		Female	
		N	*M*	*N*	*%*	*N*	*%*	*N*	*%*	*N*	*%*
ANR	97-98	653	3.74	491	70.5	205	29.5	258	49.9	259	50.1
	s98-99	514	3.89	378	72.1	146	27.9	209	51.0	201	49.0
	99-00	379	3.85	260	68.2	121	31.8	183	55.8	145	44.2
	00-01	22	3.64	20	90.9	2	9.1	9	45.0	11	55.0
WNU	97-98	340	4.01	279	80.9	66	19.1	107	48.0	116	52.0
	s98-99	62	3.65	55	88.7	7	11.3	18	39.1	28	60.9
	99-00	304	3.82	278	89.1	34	10.9	143	55.4	115	44.6
	00-01	74	4.00	119	75.3	39	24.7	68	45.6	81	54.4
WU	97-98	827	3.74	623	75.2	206	24.8	340	48.5	366	51.8
	s98-99	874	3.85	640	72.8	239	27.2	388	49.2	400	50.8
	99-00	718	3.87	496	69.0	223	31.0	325	48.9	340	51.1
	00-01	671	3.93	455	67.3	221	32.7	318	51.5	299	48.5

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Appendix B. Chi-square results for the analysis of racial/ethnic differences across groups within years.

Year	Group	Chi-square value	P-value
1997-1998	Overall	X2 (2) = 13.278	p = 0.001
	ANR vs WNU	X2 (1) = 12.767	p < 0.001
	ANR vs WU	X2 (1) = 4.075	p = 0.044
	WNU vs WU	X2 (1) = 4.476	p = 0.034
1998-1999	Overall	X2 (2) = 7.979	p = 0.019
	ANR vs WNU	X2 (1) = 7.892	p = 0.005
	ANR vs WU	X2 (1) = 0.785	p = 0.785
	WNU vs WU	X2 (1) = 7.583	p = 0.006
1999-2000	Overall	X2 (2) = 51.543	p < 0.001
	ANR vs WNU	X2 (1) = 42.991	p < 0.001
	ANR vs WU	X2 (1) = 0.064	p = 0.800
	WNU vs WU	X2 (1) = 47.058	p < 0.001
2000-2001	Overall	X2 (2) = 8.789	p = 0.012
	ANR vs WNU	X2 (1) = 2.669	p = 0.102
	ANR vs WU	X2 (1) = 5.459	p = 0.019
	WNU vs WU	X2 (1) = 3.828	p = 0.05

Note: ANR = Applicant non-recipient; WNU = winner non-user; WU = winner user

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Appendix C. Chi-square results for analyses of previous school of enrollment within subgroups across years.

Year	Group	Chi-square value	P-value
Applicant non-recipient	Overall	X2 (3) = 117.890	$p < 0.001$
	1997-1998 vs 1998-1999	X2 (1) = 108.127	$p < 0.001$
	1997-1998 vs 1999-2000	X2 (1) = 72.458	$p < 0.001$
	1997-1998 vs 2000-2001	X2 (1) = 14.182	$p < 0.001$
Winner non-user	Overall	X2 (3) = 79.095	$p < 0.001$
	1997-1998 vs 1999-2000	X2 (1) = 70.087	$p < 0.001$
	1997-1998 vs 2000-2001	X2 (1) = 42.795	$p < 0.001$
	1998-1999 vs 1999-2000	X2 (1) = 7.210	$p = 0.007$
	1998-1999 vs 2000-2001	X2 (1) = 3.933	$p = 0.047$
Winner user	Overall	X2 (3) = 44.426	$p < 0.001$
	1997-1998 vs 1998-1999	X2 (1) = 20.930	$p < 0.001$
	1997-1998 vs 1999-2000	X2 (1) = 31.123	$p < 0.001$
	1997-1998 vs 2000-2001	X2 (1) = 37.518	$p < 0.001$

Note: Only statistically significant results are included in this table.

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